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(54) Title: AUCTION MARKET WITH PRICE IMPROVEMENT MECHANISM

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## (57) Abstract

A system for auctioning financial products (20) over a distributed, networked computer system includes a plurality of workstations for entering orders for financial products into the distributed, networked computer system. The order specify a price for the financial product, a quantity of the financial product and exposure time which the order can remain active. The system also includes a plurality of workstations for entering predefined relative indication and responses for orders for the product. The predefined relative indication specify a willingness to trade. The responses specify a price and quantity. The system includes a server computer coupled to the workstations for entering the orders, predefined relative indications, and the responses, with server computer executing a server process that for a first one of said orders, determines a match to said first order with the predefined relative indications, responses and contraside orders during an interval determined by the exposure time specified by said first order.

## (57) Abrégé

La présente invention concerne un système de mise aux enchères de produits financiers (20) via un système informatique distribué, en réseau comprenant une pluralité de stations de travail permettant l'introduction dans le système informatique distribué en réseau d'ordres se rapportant à des produits financiers. L'ordre mentionne un prix du produit financier, une quantité du produit financier, et une durée d'ouverture pendant laquelle l'ordre reste valable. Le système comporte également une pluralité de stations de travail permettant la fourniture d'indications relatives définies et de réponse pour les ordres se rapportant au produit. L'indication relative définie mentionne une volonté d'entrer en affaires. Les réponses précisent un prix et une quantité. Le système comprend un ordinateur serveur couplé aux stations de travail permettant la fourniture des ordres, d'indications relatives définies et de réponse. En l'occurrence, l'ordinateur serveur exécute un processus serveur qui détermine pour le premier des ordres s'il y a concordance avec ledit premier ordre, les indications relatives définies, les réponses et les ordres en contre pendant un intervalle de temps déterminé par la durée d'ouverture spécifiée par le premier ordre.

PCT

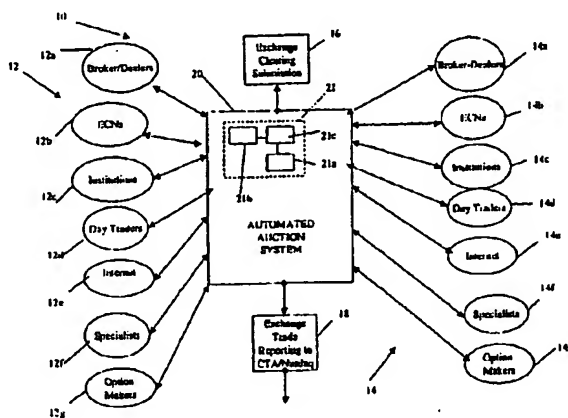
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(54) Title: AUCTION MARKET WITH PRICE IMPROVEMENT MECHANISM



(57) Abstract

A system for auctioning financial products (20) over a distributed, networked computer system includes a plurality of workstations for entering orders for financial products into the distributed, networked computer system. The order specify a price for the financial product, a quantity of the financial product and exposure time which the order can remain active. The system also includes a plurality of workstations for entering predefined relative indication and responses for orders for the product. The predefined relative indication specify a willingness to trade. The responses specify a price and quantity. The system includes a server computer coupled to the workstations for entering the orders, predefined relative indications, and the responses, with server computer executing a server process that for a first one of said orders, determines a match to said first order with the predefined relative indications, responses and contraside orders during an interval determined by the exposure time specified by said first order.

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**Description**

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## AUCTION MARKET WITH PRICE IMPROVEMENT MECHANISM

## BACKGROUND

This invention relates to an automated auction system for trading products such as equity securities.

There are known auction processes. One type of auction process is a live auction used to trade antiques or paintings, for example. Other auctions include live auction processes for financial instruments such as, for example, futures contracts, and for equities in a stock exchange. Examples of live auction processes for stocks include the New York Stock Exchange® (NYSE) or the American Stock Exchange® (AMEX).

On the NYSE and AMEX, for example, orders to buy and sell generally are not executed with an automated process. Instead, a person called a "specialist" stands in front of a crowd, taking orders from the crowd and tries to match the orders with other participants in the crowd, his own account, or sends them to other market centers. While many of the tools a specialist uses to receive orders and record and report final trades are automated, the executions themselves, including the decisions and processes to execute, are overseen in a manual manner. This is in contrast to automated markets, such as the Nasdaq Stock Market, where executions often take place without human intervention. The Nasdaq Stock Market® is an example of an electronic negotiated market involving dealers that negotiate a trade for a security for their own account or for that of a client. Transaction recording and reporting in the NYSE and AMEX exchanges and The Nasdaq Stock Market are generally automated.

Other types of auctions are so called "call" or "periodic" auctions such as the Arizona Stock Exchange and the OptiMark™ trading system. In these types of auctions, orders are matched only at specified times

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5 during the day.

#### SUMMARY

10 According to an aspect of the invention, a  
5 method of auctioning products over a distributed  
networked computer system is provided. The method is  
executed over the system and includes entering an order  
for a product. The order can specify a price. The  
15 price can be a fixed price, a relative price or a market  
price. The order also specifies a quantity and an  
exposure time. The process also includes entering a  
response to an order, the response specifying a price,  
20 price improvement, and quantity and matching the order  
with the response in accordance with the exposure time  
specified by the order.

25 According to an additional aspect of the  
invention, a method can include entering pre-defined  
relative indications that correspond to a willingness to  
buy or sell the product and wherein the pre-defined  
30 relative indications specify a price relative to a  
current market price.

35 According to an additional aspect of the  
invention, a method of auctioning financial products  
over a distributed, networked computer system includes  
25 entering orders for financial products into the  
distributed, networked computer system, said orders  
specifying a price for the financial product, a quantity  
of the financial product and exposure time which the  
40 order can remain active and entering responses to orders  
for the product, said responses specifying a price and  
quantity. For a first one of the orders, matching said  
45 first order to the responses and contra-side orders,  
during an interval determined by the exposure time  
specified by said first order, and expiring the first  
35 one of the orders if no matching responses or others of

said orders are received during the exposure period.

According to an additional aspect of the invention, a computer program product for auctioning products, the computer program product residing on a computer readable medium comprising instructions for causing a computer to receive an order that was entered for a product, the order specifying price, quantity and exposure time and receive a response that was entered in response to an order, the response specifying a price, price improvement, and quantity. The program also includes instructions to match the order with the response during the exposure time specified by the order.

According to an additional aspect of the invention, a system for auctioning financial products over a distributed, networked computer system includes a plurality of workstations for entering orders for financial products into the distributed, networked computer system. The orders specify a price for the financial product, a quantity of the financial product and exposure time which the order can remain active. The system also includes a plurality of workstations for entering responses to orders for the product. The responses specify a price and quantity. The system includes a server computer coupled to the workstations for entering the orders and the responses, with the server computer executing a server process that, for a first one of said orders, determines a match to said first order with the responses and others of said orders during an interval determined by the exposure time specified by said first order.

One or more of the following advantages may be provided by aspects of the invention. The auction process is active when an order is presented to the system. Thus, unlike the auction markets with physical

5 trading floors and crowds, the auction process and  
system of the present invention provides complete  
automation for both access and execution for  
transactions. An auction is available anytime an order  
10 5 arrives in the system. The order can be immediately  
matched with a contra side order if available, instead  
of having to wait until a specified time of day or  
interval to elapse.

15 Entries to match against an order in the  
10 auction system can include fixed price, relative price  
and predefined relative indications. Responses which  
are entered in response to entry of an order can have a  
20 lifespan but preferably responses have no lifespan, that  
is, they are either immediately matched or canceled.

15 The entity entering the responses can choose  
25 what types of orders to respond to. For example, there  
are two broad types of orders, public agency orders,  
e.g., a retail customer, or institutional customer and  
professional orders, e.g. professional traders or broker  
30 20 dealers trading for their own account. There are  
corresponding types of responses, public responses and  
professional responses. Often persons who enter public  
responses may not want to deal with professional traders  
35 since the professional traders may have more knowledge  
25 concerning order flow, volume and so forth. This system  
allows them to select the type of order to respond to.

40 The auction system permits the use of pre-  
defined relative indications. A pre-defined relative  
indication, therefore, is a willingness or an expression  
30 to trade that resides in the system and remains dormant  
and unseen by other participants. This mechanism also  
45 allows trading interest to remain anonymous as to price,  
size and identity. A pre-defined relative indication,  
when activated, becomes a response that is priced  
35 50 relative to a standard reference quote, e.g., the



National Best Bid/offer (NBBO).

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of an auction system.

FIGS. 2-8 are block diagrams of auction examples.

FIGS. 9A-9C are flow charts showing entry formats for orders, responses and pre-defined relative indications.

FIGS. 10A-10C are flow charts showing the auction process used in the system of FIG. 1.

FIG. 11 is a flow chart showing a pre-defined relative indication queue ordering process.

FIG. 12 is a flow chart of a response match process used in the process of FIGS. 10A-10C.

#### DESCRIPTION

Referring now to FIG. 1, a networked auction system 10 designed to facilitate trading of products such as real property, personal property, and financial property such as equity securities and/or other financial instruments such as bonds, options, futures, and so forth is shown. The networked auction system 10 will be described in terms of a system and process in which financial instruments such as stocks are auctioned. Any product could be auctioned particularly if the product has a value or price that can vary over short periods of time.

The networked auction system 10 includes an order entry side 12 comprised of any/all of broker/dealer systems 12a, electronic communication network (ECN) systems 12b and public participant systems 12c that enable members of the public to participate in the networked auction system 10 either directly, via

5 the Internet, or indirectly, via the Internet or another  
communication medium, through a sponsor such as a  
broker/dealer. Each of the systems 12 allow the various  
participants to enter orders into an automated auction  
10 5 system 20. The order entry portion 12 of the networked  
auction system 10 can also include day trader systems  
12d, institutional systems 12e, exchange specialists  
12f, and option market makers 12g.

15 The networked auction system 10 also includes  
10 an order response side 14. The order response side 14  
can include the same participants including  
broker/dealer systems 14a, ECN systems 14b, Internet  
20 based participant systems 14c, either direct or  
sponsored, day trader systems 14d and institutional  
15 systems 14e and exchange specialists 14f, and option  
market makers 14g. The responders can use the same  
25 physical system as is used to enter orders except the  
responders would use an order response process. These  
systems 14 may be referred to herein as the "crowd."

30 20 With these order response systems 14, when an order is  
presented, via the order entry systems 12a-12g, any one  
or more of the order response systems 14a-14g can  
respond to the order. Whichever order response system  
35 14 responds first to the order and meets or exceeds the  
25 terms of the order will result in a match for execution.

The response systems 14a-14g can also enter pre-defined  
relative indications (described below) that express a  
40 participant's willingness to trade. Each of the order  
entry systems 12a-12g and order response systems 14a-14g  
30 are representative of types of trader systems and, in  
fact, in any practical example of such a system, there  
45 could be many hundreds, thousands, etc. of any one type  
or other types of order entry and order response  
systems.

5           The order entry systems 12 or the order  
response systems 14 can be workstations. The  
workstations can have an interface to communicate with  
the automated auction system 20. Alternatively, the  
10       5 workstations can have an application program interface  
that is developed to interface with the automated  
auction system 20 or the Financial Information Exchange  
protocol customized to the auction system 20.

15           The automated auction system 20 includes at  
10       least one server system 21 including a process 21a that  
is coupled to the order systems 12 and response systems  
14 via a network (not shown) parts of which can be  
20       proprietary networks and parts of which can be the  
Internet. The server system 21 executes a server  
15       process 100 (FIGS. 10A-10C) that is stored on a storage  
medium 21b and which is executed in computer main memory  
25       216 that is part of the server 21. The auction system  
20 also is coupled to an exchange clearing submission  
system 16 and an exchange trade reporting system 18.

30       20 The automated auction system 20 submits exchange  
clearing submissions to the clearing system 16 and  
reports execution of trades to the reporting system 18.

35       Trade reporting is accomplished for every execution,  
(e.g. within 90 seconds of the execution of the trade),  
25       so that the trade can be reported for dissemination to  
vendors of market news, i.e., news outlets, and so  
forth. The reporting system 18 is a Securities and  
40       Exchange Commission (SEC) or other regulatory approved  
or authorized process through which all trade reports in  
30       public securities are disseminated, i.e., the  
Consolidated Tape Association (CTA) for exchange-listed  
45       stocks, and through the NASD/Nasdaq for Nasdaq-listed  
stocks.

50       The automated auction system 20 can be a  
35       facility of a stock exchange, a market or a self

5 regulatory organization (SRO). As a facility of an SRO  
which may include an exchange or market, every trade  
that is executed in the automated auction system 20 is  
given to the SRO so that the SRO can report the trade  
10 5 and perform other regulatory and clerical operations.

The automated auction system 20 matches orders  
with responses, other orders, and pre-defined relative  
indications of willingness to trade. Once an order is  
15 10 matched to a response, another order, or pre-defined  
relative indication, the match is considered a  
preliminary execution in the automated auction system  
20. The preliminary execution is given to the market or  
20 exchange, as appropriate, so that the preliminary  
execution can be validated. If the preliminary  
15 execution is a good execution, it is validated and  
forwarded to a clearing corporation for clearance and  
25 settlement. For example, the exchange can validate that  
it is a good execution, consistent with the rules of the  
SRO and the Securities Exchange Commission (SEC) or  
30 20 equivalent regulatory authority and that there are no  
existing orders that could have been executed or that  
none of the parties are suspended from trading, and so  
forth. The exchange trade clearing 16 and reporting 18  
35 are, in general, conventional, the manner that the  
25 automated auction system 20 would interface to the  
exchange trade clearing 16 and reporting 18 could be  
specified by the those systems.

40 Each order in the automated auction system 20  
has a life span. The maximum life span of an order is  
30 determined by the order entry side 14 of the auction 10.  
The life span can be variable and can be any set time  
45 period. Fixed time periods are preferred for trading  
financial securities such as stocks. Exemplary fixed  
time periods are a 15 second order, a 30 second order or  
35 a 0 second order. The fixed time periods can be chosen

5 taking into consideration the nature of the product that  
is being traded, any regulatory rules that are imposed  
on trading the product, as well as, the nature of the  
market activity. For a financial instrument such as  
10 5 stocks, regulatory rules are generally very important in  
determining time periods. Other times may be used even  
for financial instruments based on changes in regulatory  
rules. At the instant of order entry, an order is  
15 exposed to the crowd for the exposure time specified in  
the order. However, an execution can always end the  
20 auction sooner, as will be described below.

Aspects of the auction system rely upon  
20 relative prices. These prices are relative to a  
standard, variable market price. One standard pricing  
15 mechanism used in the auction system 10 when auctioning  
stocks is The National Best Bid/offer (NBBO). The NBBO  
25 is a standardized quote in the securities industry for  
the national market systems best consolidated quotation.

The National Best Bid/Offer is a quantifiable price to  
30 20 buy and sell. The NBBO is always changing and could  
change during the life of an order having an impact on  
the final price. The relative pricing mechanism uses  
the NBBO and a price improvement "pi" to produce relative  
35 prices. The "pi" enables an order to achieve the best  
25 price in the market at the current time. The provision  
of the price improvement relative to the NBBO or other  
standard market quote would tend to improve the  
40 execution price relative to the spread, i.e., the  
difference between bid and offer prices for any product  
30 or security. It also facilitates decimal denominated  
trading by enabling small price improvements of one (1)  
45 cent or even less.

Referring now to FIG. 2, an auction example  
25a is shown. An order entry participant 12 (FIG. 1),  
50 35 e.g., a broker/dealer system 12a, for example, enters a

5 customer order 30 to sell a certain number of shares,  
e.g., 500 shares of "XYZ" stock at the market. The order  
30 is entered with an order type i.e., buy (B) or sell  
(S), the number of shares, name of security and an  
10 5 exposure time, e.g., 15 seconds and optional conditions.

The National Best Bid Offer 32 (NBBO) is received by  
the automated auction system 20 for a price 125-125  
1/16. The National Best Bid Offer price at this time is  
15 only a starting reference price for the auction. In  
10 this example, the auction has a maximum life span of 15  
seconds. The entry of the order 30 starts the auction.

20 The auction ends, as soon as some response that meets  
the minimum qualifications of the order is received  
provided that the order is still actively exposed to the  
15 crowd.

25 Responses in the auction system 20 can include  
fixed price, relative price and predefined relative  
indications. Responses can have a lifespan, but  
preferably responses have no lifespan. That is, they  
30 20 are either immediately matched or canceled. The  
responses can be permitted to choose what types of  
orders they respond to. For example, there are two  
broad types of orders, public agency orders, e.g., a  
35 retail customer, or institutional customer. The second  
25 type is professional orders, e.g., professional traders  
or broker dealers trading for their own account.

40 In the example of FIG. 2, if broker/dealer B  
enters via a system 14a with a buy response 34 of a  
fixed variety, at 125.03 for 500 shares of "XYZ" and  
30 thereafter but within the exposure time, broker/dealer C  
enters, via another system 14a, a buy response 36 of a  
45 relative variety, at an NBBO +0.03 for 500 shares (which  
is 125 the NBB + \$0.03 a price improvement), the  
automated auction system 20 will execute the order  
35 between broker/dealer A and broker/dealer B since

5 broker/dealer B's order met the qualifications of the  
auction and it arrived first. This example illustrates  
that if there are two responses to an order at the same  
effective price (i.e., either fixed as was response 34  
10 or relative to the NBBO, as was response 36) the  
response first in time will be executed. In this  
example, the second response of broker/dealer C is not  
matched with the order for execution even if it was at a  
15 higher price, because the first response of  
20 broker/dealer C arrived first and satisfied the order in  
its entirety.

20 If there was a portion of the order left over,  
that is, the first broker/dealer's response 34 was for  
less than the initial order, then the second  
15 broker/dealer's response 36 would have a chance at any  
remainder. In that case, they could both execute. If,  
25 for a customer order to sell 800 shares of "XYZ" (not  
shown), broker/dealer B's response 34 to buy would result  
in a trade for 500 shares at broker/dealer B's price and  
30 broker/dealer C's response 36 would result in the  
remaining 300 shares at broker/dealer C's price which may  
be different.

35 As soon as the terms and conditions are fully  
met by a response, that response ends the auction. The  
25 automated auction system 20 is active for a maximum time  
of either the 15 seconds or 30 seconds that was chosen  
at the time of order entry. The automated auction  
40 system 20 also ends the auction for an order, if there  
were no pre-defined indications and no response that  
30 satisfied the order and any conditions attached to the  
order and chosen exposure time. Thereafter, if the  
45 order is not executed in the automated auction system  
20, the order may be eligible for a market maker  
guarantee or sent for execution outside of the system.  
50 For example, the order may be entitled either a

5 guarantee or execution elsewhere, as will be described below. The automated auction system 20 will forward the executions to the exchange for validation, trade reporting and clearance.

10 5 Referring now to FIG. 3, a second auction example 25b is shown. In this example, a customer order 40 is entered for 600 shares of "XXY" to sell at the market, i.e., at the National Best Bid Offer NBBO 42 at the time of the order execution. The exposure time is 15 15 seconds. This example is illustrative of order entry where there are two pre-defined, relative indications.

20 In this auction example 25b, the customer order 40 will accept whatever the best bid is at the time the order 40 is entered. The customer places a 15 second lifetime on the order 40. Assume that the NBBO price 42 at the time the order is entered is 49-49 1/8, 25 and that broker/dealer B and broker/dealer C had previously entered pre-defined relative indications to buy, 44, 46, respectively. These pre-defined relative 30 indications 44, 46 are responses that are entered into the auction system 20 prior to entry of an order. They are relative, meaning that they are relative to what the NBBO is at the moment they can be matched with an order.

35 A ranking process 105 that prioritizes received pre-defined relative indications by price improvement and time is described in FIG. 11.

40 In this example, broker/dealer B and broker/dealer C each have pre-defined relative indications which indicate that each would be willing to 30 participate, as in the auction system 20, to an order which is presented at the relative price of the National Best Bid Offer and optionally some price improvement. 45

50 Since the customer is a seller, the relative price is the National Best Bid (NBB) and customer is willing to accept whatever that bid is. The broker/dealer B is



5 willing to pay just the NBB and broker/dealer C is  
willing to pay the NBB + .05. Broker/dealer C's pre-  
defined indication 46 is willing to improve the National  
Best Bid (NBB) by 5 cents. If the quote was 49-49 1/8  
10 5 at the time the order from the crowd came in,  
broker/dealer B's response is based on a price of 49, the  
best bid, /broker/dealer C's relative response is 49 plus  
\$0.05 for 1000 shares. Broker/dealer C had a pre-  
15 defined relative indication 44 at a higher price than  
20 broker/dealer B's pre-defined relative indication 44 and  
therefore has higher priority. Broker/dealer C's pre-  
defined relative indication 46 therefore satisfies the  
order 40 and thus broker/dealer C buys the 600 shares at  
49 plus \$0.05. Broker/dealer C is left with a remaining  
15 pre-defined relative indication 46' (FIG. 4) for future  
25 auctions of 400 shares. Broker/dealer B missed buying  
because broker/dealer B's pre-defined relative indication  
44 was for an inferior price than the pre-defined  
relative indication 46 of broker/dealer C.

30 20 Broker/dealer B was only willing to pay the customer the  
best bid, not the best bid plus \$0.05. The automated  
auction system 20 will forward the executions to the  
exchange for validation, trade reporting and clearance.

35 Referring now to FIG. 4, broker/dealer C has a  
25 remaining pre-defined relative indication 46' for future  
auctions of 400 shares. This pre-defined relative  
indication 46' will still be available at the same  
40 priority for future auctions. The auction process 20  
includes two auction parameters that are set for all  
30 pre-defined relative indications.

45 The two auction parameters are used to manage  
exposure, but may also have the effect of governing the  
relative position of the pre-defined relative  
indications after exhaustion of one of the parameters,  
50 35 and can completely exhaust the predefined relative

5 indication for the other parameter. These parameters  
are used to give a participant an ability to manage  
financial exposure. These parameters also guarantee  
that no one participant or indication would maintain  
10 5 preferential position in the auction. One parameter is  
a maximum share amount per indication and the other is a  
maximum share amount per auction.

15 If broker/dealer C has not exceeded the  
maximum share amount per auction it can participate in  
10 the current auction in which case its pre-defined  
relative indication 46' will retain its time priority  
and therefore can match with another order 40 for here  
20 400 shares entered by broker/dealer A. If the maximum  
share amount per auction for broker/dealer C's pre-  
15 defined relative indication had been exhausted, then  
that pre-defined relative indication 46' is lowered in  
25 time priority to the end of a queue for that price  
grouping. If the maximum share amount per indication  
has been exhausted, then the pre-defined relative  
30 20 indication 46' is extinguished completely.

A pre-defined relative indication, therefore,  
is a willingness or an expression to trade that resides  
in the system and remains dormant and unseen by other  
35 participants. This mechanism also allows trading  
25 interest to remain anonymous as to price, size and  
identity. A pre-defined relative indication, when  
activated, becomes a response that is priced relative to  
40 the National Best Bid/offer (NBBO). The automated  
auction system 20 will forward the executions to the  
30 exchange for validation, trade reporting and clearance.

Referring now to FIG. 5, a fourth auction  
45 example 25d is shown. In this example 25d, a customer  
order 40' and condition 40a are entered to sell 600  
shares of "XXY". The condition 40a is that the order  
35 50 seeks a specific minimum price improvement of ".02".

5 Thus, the order is at the market (i.e., at the national  
best bid NBB at the time of the order execution) plus a  
minimum price improvement of 2 cents. The exposure time  
is 15 seconds. The exposure does not reveal the 0.02  
10 condition. This example is illustrative of a conditioned  
order within the example of two pre-defined relative  
indications.

15 In this auction example 25d, the customer  
order 40' seeks specific minimum price improvement.  
20 Broker/dealer B and broker/dealer C have each pre-  
defined relative indications 44', 46'. Broker/dealer B's  
pre-defined relative indication 44' improves the  
National Best Bid (NBB) by 5 cents. If the quote was  
49-49 1/8 at the time the order from the crowd came in,  
15 broker/dealer B's indication 44' is based on a price of  
49, the best bid, and thus broker B has a relative  
25 response of 49 plus \$0.05 for 1000 shares. Because  
broker/dealer B's pre-defined relative indication 44'  
satisfies the order and all conditions of the order, the  
30 order is matched with broker/dealer B response.  
Broker/dealer B buys the 600 shares at 49 plus \$0.05.  
Since broker/dealer B had a pre-defined indication 44  
for a larger amount than the sell order of the customer,  
35 the order is filled completely, and broker/dealer B is  
left with a remaining pre-defined relative indication of  
25 400 shares for future auctions. Broker/dealer C missed  
buying because broker/dealer C's pre-defined relative  
40 indication 46 was at a lower price than the pre-defined  
relative indication 44 of broker/dealer B.  
30 Broker/dealer C was only willing to pay the customer the  
best bid, not the best bid plus \$0.05. The automated  
45 auction system 20 will forward the executions to the  
exchange for validation, trade reporting and clearance.

5 Referring now to FIG. 6, a fifth auction  
example 25e is shown. Broker/dealer A enters a customer  
order 50 to sell 700 shares of "YYY" at the market. The  
order 50 has an exposure time of 15 seconds. Stock "YYY"  
10 5 has an NBBO 52 of 92-92 5/16. Shortly after, another  
order 58' to buy 500 shares of "YYY" at the market is  
entered for another customer by broker/dealer D. Both  
Broker/dealer B and C receive notification that an  
15 auction to sell 700 shares of "YYY" has started. Only  
20 broker/dealer C sends a response 56, subsequent to entry  
of the customer order of broker/dealer D. The automated  
auction system 20 executes the trade between the two  
customer orders of Broker/dealer A and Broker/dealer D,  
since the customer order of Broker/dealer D was entered  
15 before Broker/dealer C responded. The order execution  
price is the mid-point of the NBBO, i.e., the mid-point  
of the spread, which in this example is 92 5/32. The  
remainder of the order (200 shares) is executed with  
Broker/dealer C at the NBBO. The automated auction  
20 system 20 will forward the executions to the exchange  
for validation, trade reporting and clearance.

Referring now to FIG. 7, in example 25f  
broker/dealer A enters a customer order 60 to sell 700  
35 shares of stock "YYY" at the market. The order 60 has an  
25 exposure time of 15 seconds. The NBBO for "YYY" is 25-25  
1/16. Both Broker/dealer B and C receive notification  
that an auction to sell 700 shares of "YYY" has started.  
40 Only broker/dealer C elects to respond 66 to buy only  
500 shares.

30 The automated auction system 20 will execute  
the order between Broker/dealer A and Broker/dealer C  
45 for 500 shares at the NBBO. The remainder of the order  
(i.e., 200 shares) remains active until the original 15  
seconds elapses, at the end of which, if no other  
35 offsetting orders are entered on the opposite side of

5 the market, and no other pre-defined relative  
indications or responses come in, the order balance of  
200 shares is eligible for a market maker guarantee if  
it is a public order. That is, specially-designated  
10 5 market makers will guarantee the execution of the order  
at the NBB, thus buying 200 at the NBB existing at the  
end of the exposure period, i.e., 25, if the market were  
still 25-25 1/16. If there still remains a balance  
15 after the end of the market maker guarantee, the balance  
10 is delivered to the best available market for the stock  
on other exchanges or markets unless requested  
otherwise, as described more fully below at the end of  
20 server process 100. The automated auction system 20  
will forward the executions to the exchange for  
15 validation, trade reporting, and clearance.

25 Referring now to FIG. 8, in example 25g  
broker/dealer A is a market maker that trades with its  
own customers. Broker/dealer A enters a customer order  
70 to sell 900 shares of stock "ZZZ" at the market.  
30 20 Broker/dealer A enters this order with a special  
condition. There can be several special conditions.  
Examples of special conditions include matching the  
nominal price improvement of the crowd, sharing up to a  
35 50 split, and block match trading. The Broker/dealer  
25 determines the trade condition at order entry. Using  
the price improvement match condition, that condition  
allows broker/dealer A to trade with its customer unless  
40 the crowd responds with more than a nominal price  
improvement, e.g., better than NBBO + .02 cents.

30 In this example, the order 70 has an exposure  
time of 30 seconds. The stock "ZZZ" has a NBBO 132-132  
45 1/8. Both Broker/dealer B and C receive notification  
that an auction to sell 900 shares of "ZZZ" has started.

Only broker/dealer C elects to respond, with a relative  
50 35 response 76 of NBBO +0.01. The automated auction system

20 will execute the entire order between Broker/dealer A and Broker/dealer A's customer at NBBO + .01 cents because no crowd member provides more than the nominal price improvement e.g., 0.02.

If Broker/dealer's C response was for NBBO + .03 cents, the order would have been executed with broker/dealer C up to the size of broker/dealer C's response, since in this example, broker/dealer C would have provided more than nominal price improvement. The automated auction system 20 will forward the executions to the licensed exchange for validation, trade reporting, and clearance.

The 50% split trading condition allows the crowd to obtain up to a set percentage e.g., 50% of the order at various prices. If there is crowd interest beyond 50% of the order, the broker/dealer will trade at the prices of the crowd interest that is beyond 50% of the order, and for any balance beyond that the broker/dealer will trade at the NBBO. For block match trading, the broker/dealer specifies an amount that the broker/dealer would facilitate the block at after the crowd had an opportunity to respond up to some portion of the block, e.g., 20%. The broker/dealer would take the 20% of the block with the crowd having an opportunity for the balance. If there are no responses, the dealer takes 20% of the block and the balance is unexecuted. The unexecuted balance could execute outside of the system. If there is crowd interest, the crowd trades for portions of the block at various prices up to 80% of the block, and the broker/dealer trades for any remainder of the block. If there is crowd interest beyond 80%, the broker dealer trades at the price established by the crowd up to the crowd interest, i.e. the quantity specified by the crowd. Any balance will trade at the NBBO.

5           The broker/dealers can also act as principals,  
i.e., act for their own account or as registered market  
makers. A registered market maker is a type of  
broker/dealer that has its own distribution network for  
10       5 the receipt of orders. For instance, large brokerage  
houses may have many branch offices and receive orders  
from those branch offices. They can execute the orders  
internally meaning that if they are a market maker on a  
15       specific security, they will execute the trade  
themselves instead of delivering the trade to an  
exchange for exposure and/or interaction with others for  
20       execution. The auction system 10 enables the order to  
obtain the best price available regardless of whether  
the broker/dealer entering it is acting as a registered  
15       market maker or in a principal, riskless principal, or  
agency capacity.

25           Referring now to FIG. 9A, an exemplary format  
for an order entry 101 for the auction system 10 is  
shown. The order entry 101 includes information 101a  
30       20 entered by the order entry side of the auction. The  
information can include a security symbol, an indication  
of whether the order is to buy or sell, a quantity, an  
exposure period, and price, either fixed, market or  
35       conditions such as a price improvement relative to the  
NBBO or other conditions all or none etc. The order  
25       entry 101 is transmitted 101b to the auction system 20.  
Orders with a fixed price may be treated differently  
40       (executed immediately i.e., a zero second order or  
canceled) depending on regulatory requirements.

30           Referring now to FIG. 9B, a format for a  
response 114 is also shown. The response 113 includes  
45       information 115a including a security symbol, a price or  
a price improvement, a quantity of shares and a buy/sell  
indication. The response information 115a is also  
35       transmitted 115b to the auction system 20 and is placed

5 in a queue (not shown).

Referring now to FIG. 9C, a format for a pre-defined relative indication 107 is shown to include an information portion 107a which includes a security  
10 5 symbol, a relative price improvement, a quantity and an indication type, either buy or sell. The information 107a is also transmitted 107b to the auction system 20. In the auction system 20 the pre-defined relative  
15 indication is sorted 107c by type, e.g., buy or sell and  
20 by price and time received.

Referring now to FIGS. 10A-10B, a server process 100 that may be executed on the auction system  
20 20 is shown. The server process 100 receives an order 101 entered by the order side 12 of the system 10, via  
15 the order entry format 101 (FIG. 10A). The process 100 exposes 104 the order to the crowd, i.e., potential  
25 responders 14, via an electronic broadcast over the network systems mentioned above. The system 10 displays the size of the order and the order remains displayed  
30 20 for the life span of the order or until an execution ends the auction. The process 100 compares 106 the order to any existing pre-defined relative indications, contra-side orders or responses (if responses are chosen  
35 to have a lifetime as discussed below) that exist in the system 10 at order receipt.

If there are pre-defined relative indications or contra-side orders or responses (if responses have a  
40 lifetime) in the system 10, the process 100 will attempt to match 108 those existing pre-defined relative  
30 indications or contra-side orders or responses to the order. For predefined relative indications, the match  
45 process 108 will examine the pre-defined relative indication that exists, at the best price and which is the oldest at that best price, and will determine  
35 whether that pre-defined relative indication matches any



5 conditions that may exist with the order. The same  
criteria could be applied to existing contra-side orders  
or responses. If there is a match, the order will be  
executed 110 with that pre-defined relative indication.

10 5 If there is not a match, the process can  
iterate through a queue of pre-defined relative  
indications, contra-side orders and responses to  
15 determine the next oldest pre-defined relative  
indications, contra-side orders and responses at that  
20 best price to determine a match. The match process 108  
attempts to find the pre-defined relative indications,  
contra-side orders and responses with the best price  
improvement or best price, as appropriate, and that is  
15 the oldest in the auction system 20 at that price  
improvement and which satisfies all conditions of the  
25 order and validating constraints that may apply. For  
example, if a price is specified outside of the NBBO it  
may be matched by the system 20 but will not pass  
30 validation. The system 20 can adjust the price so that  
it falls at the NBBO at the time of the execution.

If there are no matching existing pre-defined  
relative indications, contra side order or responses,  
35 the process 100 will continually receive contra side  
25 orders 101, responses 113, and newly arriving pre-  
defined relative indications 107. The process 100 will  
compare 112 contra side orders 101 to the current order.

40 If there is a match it will execute the order. If  
there is no match the process 100 will determine if  
30 responses or new pre-defined relative indications 107  
match 118 the current order.

45 The compare for contra side orders and then  
for responses or new predefined relative indications  
implies some preference for contra side orders.  
35 However, the process 100 could compare 112 contra side

5 orders, responses and new predefined relative indications to the current order using an age and/or price criteria.

If there is a match it will execute the order.

10 5 If there is no match the process 100 will determine if responses or new pre-defined relative indications 107 match 118 the current order. The process 100 will perform the compare and matches over a life span window  
15 that is determined by the exposure period specified 119 by the order entry 101. If the process 100 determines a match 116 or 118, the order will be executed 117. Otherwise, the process 100 will continue to wait until  
20 the exposure time period 119 specified in the order 101 has elapsed 118. If the process 100 does not receive a  
15 matching response within that time period, as shown in FIG. 10B, the process 100 will expire 124 the auction  
25 process for that order.

The process 100 will determine 122 whether there are other orders in the auction and, if there are  
30 20 other auctions, will return to compare 106 the other received orders to the pre-defined relative indications and so forth to start a new auction. If the process 100 expires the order 119, the process 100 will also send  
35 120 the expired order or any unexecuted portion of the  
25 order to a guarantee process and/or execution outside of the process 100.

An alternative arrangement to that shown above  
40 could have the process 20 allow responses to have a lifespan coextensive with the lifespan of the auction  
30 process. If the system 20 allows responses to have a lifespan, but if there are no other orders, the process  
45 100 will expire (not shown) all remaining responses in the system 20.

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5 Another example would have the compare 106 and  
match 108 performed only for predefined relative  
indications. If there was not a match with a predefined  
relative indication, the process 100 would iterate  
10 5 through a queue of pre-defined relative indications to  
determine the next oldest pre-defined relative  
indication, at that best price to determine a match.  
The match process 108 attempts to find the pre-defined  
15 relative indication with the best price improvement, and  
20 that is the oldest in the auction system 20 at that  
price improvement and which satisfies all conditions of  
the order and validating constraints that may apply.

20 A still further option could have the entry of  
an order start an auction process at which time the  
15 auction system 20 could collect all responses over the  
25 exposure duration. The auction system would then sort  
the received responses by some criteria that produces  
the best response based on price and size.

Referring now to FIG. 10C, the expired order  
30 20 or any remaining portion thereof is transmitted 120, if  
qualified 123 for guaranteed execution 125, against  
certain designated market makers who will be matched  
with the order at the prevailing NBBO, up to the lesser  
35 of an established threshold (e.g. 1099 shares and is a  
25 public agency order) or the size associated with the  
NBBO. If, after any match has occurred, an unexecuted  
balance still remains 126, that order balance is  
40 transmitted 128, (unless the customer has indicated  
otherwise) to the market quoting the best price in that  
30 stock, such market being another exchange or market that  
trades the security and with which there is maintained a  
45 link for delivering orders. For example, in the case of  
an exchange-listed stock the link that would be used  
currently is the Intermarket Trading System (ITS), or,  
50 35 in the case of a Nasdaq stock, the link would be Small

5 Order Execution System (SOES<sup>SM</sup>) and/or SelectNet<sup>SM</sup>, or a  
successor system. Thus, at each stage of the process,  
from auction, through market maker guarantee, and then,  
if there is a balance, through to other market centers,  
10 5 the original order has an opportunity for price  
improvement, but in any case should always obtain the  
best prices publicly available in the marketplace as a  
whole.

15 Referring now to FIG. 11, a pre-defined  
10 indication ranking process 105 is shown for ranking pre-  
defined indications by price improvement and time  
received. The pre-defined indication ranking process  
20 105 receives 130 a pre-defined relative indication and  
assigns 132 it a time stamp. The process determines 134  
15 whether the pre-defined relative indication is for a buy  
or a sell. If the pre-defined relative indication is  
25 for a buy, the process 105 parses 136 the pre-defined  
relative indication to extract the price improvement  
"pi", as specified in the pre-defined relative  
30 20 indication. This price improvement "pi" is compared 138  
to previously received price improvements "pi<sub>q</sub>." The  
compare process 138 looks to find a previously received  
price improvement grouping that is equal to, greater  
35 than, or less than the current price improvement. If  
25 the process 105 finds a price grouping that is equal to  
a current price improvement "pi" the process 105 places  
140 the received pre-defined relative indication at the  
end of that price improvement grouping. Otherwise, a  
new grouping at the highest, lowest, or at an  
30 intermediate price improvement level is produced for the  
received pre-defined relative indication.

45 The process 105 will perform a similar sorting  
process 105 including comparing 138' and placing the  
received pre-defined relative indication into a price  
35 improvement grouping if the received pre-defined

5 relative indication is determined 134 to be a sell  
indication. After the process 105 sorts the received  
pre-defined relative indication, it returns 144. The  
process can keep track of the pre-defined relative  
10 5 indication by use of a queue (not shown).

Referring now to FIG. 12, the match process  
118 is shown. At the initiation of the auction, the  
match process 118 retrieves 160 any response or new pre-  
15 defined relative indication in the auction system 20.  
20 The match process 116 determines if the retrieved new  
pre-defined relative indication or a response matches  
162 to the current order. If there is a match 166, the  
match process 118 will tentatively execute 117 (FIG.  
10A) the order with the matched response 113, or new  
15 pre-defined relative indication 107 or newly arriving  
contra side orders. If there is not a match, the match  
25 process 118 will increment a pointer for example, to the  
next oldest pre-defined relative indication or will  
examine a new response. The match process 118 retrieves  
30 160 the next oldest pre-defined relative indication and  
will repeat the match process 118 to determine if the  
retrieved pre-defined relative indication or a new  
response matches 162 the order. If there is a match,  
35 the match process 118 will execute 117 the order with  
25 the matching response, pre-defined relative indication.  
The match process 118 will continue until the lifetime  
period has expired or until an order has been executed.

40 The match process 108 (FIG. 10A) matches  
orders with pre-defined relative indications that pre-  
30 existed at order entry. The match process 108 matches  
first on the basis of best price and then on the basis  
45 of oldest pre-defined relative indication at the best  
price. On the other hand, the match process 118 matches  
against active responses, and subsequently received pre-  
50 35 defined relative indications by the oldest that meets

the terms of the order.

Other Embodiments

It is to be understood that while the invention has been described in conjunction with the detailed description thereof, the foregoing description is intended to illustrate and not limit the scope of the invention, which is defined by the scope of the appended claims. Other aspects, advantages, and modifications are within the scope of the following claims. For example the auction process can be used with other products such as goods, commodities, works of art, etc.

It is especially suitable for items that have a value that can change over time in accordance with fluctuations in market conditions.

What is claimed is:

**Claims**

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## CLAIMS

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1. A method of auctioning products, said method  
5 executed over a distributed networked computer system,  
said method comprising:

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entering an order for a product, the order  
specifying a price which can be a relative price, a  
market price or a fixed price, and specifying a quantity  
10 and an exposure time;

20

entering a response to an order, the response  
specifying a price, which can be a relative, fixed price  
or a relative price with a price improvement, and  
quantity; and

25

15 matching the order with the response in  
accordance with the exposure time specified by the  
order.

30

2. The method of claim 1 wherein a plurality of  
20 orders and responses are entered, and wherein matching  
further comprises:

35

matching a first one of the orders with the  
responses during the exposure time interval specified by  
the order.

25

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3. The method of claim 1 wherein a plurality of  
orders and responses are entered, and wherein matching  
further comprises:

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collecting all responses during the exposure  
30 interval, and matching a first one of the orders to an  
optimal one of the responses that is determined in  
accordance with price and quantity specified in the  
optimal one of the responses.

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- 5           4.           The method of claim 1 wherein the products are  
financial instruments.
- 10           5.           The method of claim 1 wherein matching  
5 retrieves an oldest response and determines whether the  
oldest response includes a price that satisfies a price  
specified by the order.
- 15           6.           The method of claim 1 further comprising:  
10           expiring the order if the exposure time  
specified by the order has elapsed and no matching  
response was received.
- 20           7.           The method of claim 1 further comprising:  
15           entering pre-defined relative indications that  
25 correspond to a willingness to buy or sell the product;  
and  
              wherein the pre-defined relative indications  
specify a price relative to a current market price.
- 30           8.           The method of claim 7 wherein the pre-defined  
20 relative indications specify a quantity of the product.
- 35           9.           The method of claim 1 wherein entering orders  
25 further comprises:  
              specifying a product.
- 40           10.          The method of claim 1 wherein entering  
responses further comprises:  
30           specifying a product.
- 45           11.          The method of claim 7 wherein matching further  
comprises:  
              retrieving an oldest response, other order, or  
35 pre-defined relative indication and determining whether
- 50

5 the oldest response, other order, or pre-defined  
relative indication satisfies the order.

10 12. The method of claim 7 wherein retrieving  
5 further comprising:  
matching pre-defined relative indications to  
the order with the pre-defined relative indications  
ranked by price and within a price ranking by time.

15 13. The method of claim 12 further comprising:  
expiring the order if the exposure time  
specified by the order has elapsed and no matching  
20 response, other order, or pre-defined relative  
indication was received.

25 14. A method of auctioning financial products over  
a distributed, networked computer system, said method  
comprising:

30 entering orders for financial products into  
20 the distributed, networked computer system, said orders  
specifying a price for the financial product, a quantity  
of the financial product and exposure time which the  
order can remain active;

35 entering responses to orders for the product,  
25 said responses specifying a price and quantity; and for  
a first one of said orders,

40 matching said first order, to the responses  
and contra-side orders, during an interval determined by  
the exposure time specified by said first order; and

30 45 expiring the first one of the orders if no  
matching responses or contra-side orders are received  
during the exposure period.

50 15. The method of claim 14 further comprising:  
35 executing a trade between the first order and

5 one of the contra-side orders or responses that matched  
the first order.

10 16. The method of claim 15 wherein executing a  
5 trade further comprises:  
reporting the first order and the matched one  
of the contra-side orders or responses to a facility of  
a self-regulatory organization for market validation.

15 17. The method of claim 14 wherein the orders can  
10 further include conditions attached to the order.

20 18. The method of claim 17 wherein the conditions  
can include a price improvement.

15 19. The method of claim 14 wherein entering  
25 further includes entering pre-defined relative  
indications.

30 20. The method of claim 19 wherein entering pre-  
defined relative indications can occur before or after  
an order is entered.

35 21. The method of claim 14 wherein the process  
25 determines whether a match price falls outside of a  
spread specified for the product.

40 22. The method of claim 14 wherein for trading by  
a broker dealer, the system allows the broker/dealer to  
30 specify specific trading options when the broker dealer  
is trading with its own customer.

45 23. The method of claim 14 wherein an expired  
order is sent for a guarantee execution by a market  
50 maker or for execution on a market or an exchange.

5

24. A computer program product for auctioning products, said computer program product residing on a computer readable medium comprising instructions for causing a computer to:

10

receive an order that was entered for a product, the order specifying price, quantity and exposure time;

15

receive a response that was entered in response to an order, the response specifying a price, price improvement, and quantity; and

20

match the order with the response during the exposure time specified by the order.

25

25. The computer program product of claim 24 wherein the products which are auctioned are products that have a value that changes with market conditions.

30

26. The computer program product of claim 24 wherein instructions that cause the computer to match further comprise instructions that cause the computer to:

35

retrieve an oldest response and determine whether the oldest response includes a price that satisfies a price specified by the order.

25

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27. The computer program product of claim 24 further comprising instructions that cause a computer to:

30

expire the order if the exposure time specified by the order has elapsed and no response that matched the order was received.

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28. The computer program product of claim 24 further comprising instructions that cause the computer

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to:

receive pre-defined relative indications that correspond to a willingness to buy or sell the product, with the pre-defined relative indications specifying a price relative to a current market price.

29. The computer program product of claim 25 wherein the pre-defined relative indications specify a quantity.

30. The computer program product of claim 24 wherein orders specify a product.

31. The computer program product of claim 24 wherein responses specify a product.

32. The computer program product of claim 24 wherein instructions that cause the computer to match further comprise instructions that cause a computer to: retrieve an oldest response, contra-side order, or pre-defined relative indication and determine whether the oldest response, contra-side order, or pre-defined relative indication satisfies the order.

33. A system for auctioning financial products over a distributed, networked computer system, said system comprising:

a plurality of workstations for entering orders for financial products into the distributed, networked computer system, said orders specifying a price for the financial product, a quantity of the financial product and exposure time which the order can remain active;

a plurality of workstations for entering

5           responses to orders for the product, said responses  
          specifying a price and quantity;

          a server computer coupled to the workstations  
          for entering the orders and the responses, said server  
10       5 computer executing a server process that for a first one  
          of said orders,

          determines a match to said first order  
          with the responses and contra-side orders during an  
15       interval determined by the exposure time specified by  
20       said first order.

34.       The system of claim 33 wherein the server  
20       process

          executes a trade between the first order and  
15       one of the other orders or responses that matched the  
25       first order.

35.       The system of claim 34 wherein the server  
          process executes a trade and reports the first order and  
30       20 the one of the contra-side orders or responses that  
          matched the first order to a facility of a self-  
          regulatory organization for market validation.

36.       The system of claim 35 wherein the orders can  
35       25 further include conditions attached to the order.

37.       The system of claim 36 wherein the conditions  
40       can include a price improvement.

38.       The system of claim 33 wherein the response  
30       workstations can enter pre-defined relative indications  
45       that can exist in the system before an auction for the  
          product has started.

35

5 39. The system of claim 33 wherein the response  
workstations can enter pre-defined relative indications  
after an order was entered.

10 5 40. A system for auctioning financial products  
over a distributed, networked computer system comprises:  
a plurality of workstations for entering  
orders for financial products into the distributed,  
15 networked computer system, the orders specify a price  
20 for the financial product, a quantity of the financial  
product and exposure time which the order can remain  
active;

a plurality of workstations for entering  
predefined relative indications and responses to orders  
25 for the product, the predefined relative indications  
specifying a willingness to trade, the responses  
specifying a price and quantity; and

a server computer coupled to the workstations  
for entering the orders, predefined relative  
30 indications, and the responses, with the server computer  
executing a server process, said server process  
comprising software to:

determine a match to a first order with  
35 the predefined relative indications, responses and  
25 contra- side orders during an interval determined by  
the exposure time specified by said first order.

40 41. A method of auctioning a product, said method  
comprising:

30 entering a pre-defined relative indication  
that corresponds to a willingness to buy or sell the  
45 product with the pre-defined relative indication  
specifying a price relative to a current market price.

50 35

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- 5           42.           The method of claim 41 the predefined relative  
indication allows trading interest to remain anonymous  
as to price, size and identity until matched with an  
order.
- 10           5           43.           The method of claim 41 wherein said method is  
executed over a distributed networked computer system.
- 15           44.           The method of claim 43, further comprising:  
10           entering an order for a product, the order  
specifying a price which can be a relative price, a  
market price or a fixed price, and specifying a  
20           quantity.
- 15           45.           The method of claim 44 further comprising:  
25           matching the order with the predefined  
relative indication in accordance with the exposure time  
specified by the order.
- 30           20           46.           The method of claim 43 further comprising:  
matching the order with the predefined  
relative indication in accordance with the exposure time  
specified by the order and in accordance with a time of  
35           receipt of the predefined relative indication.
- 25           47.           The method of claim 43 wherein the order  
specifies an exposure time.
- 40           48.           The method of claim 43 further comprising:  
30           entering a response to an order, the response  
specifying a price, which can be a relative or fixed  
45           price or a contra-side order that may have a condition  
seeking a relative price improvement, and quantity.



5 49. The method of claim 48 wherein a plurality of orders, predefined relative indications and responses are entered, and wherein matching further comprises:

10 matching a first one of the orders with one or more of the predefined relative indications or responses during the exposure time interval specified by the order.

15 50. The method of claim 49 wherein matching further comprises:

20 collecting all predefined relative indications and responses during the exposure interval, and matching a first one of the orders to an optimal one of the responses that is determined in accordance with price and quantity specified in the optimal one of the responses.

25 51. The method of claim 43 wherein the products are financial instruments.

30 52. The method of claim 43 wherein the pre-defined relative indication specifies a quantity of the product.

35 53. The method of claim 43 wherein a plurality of predefined relative indications are entered and said method further comprises:

40 ranking the predefined relative indications by price and within a price ranking by time.

30 54. The method of claim 53 wherein matching further comprises:

45 matching at least one pre-defined relative indication to the order.

50 35

5 55. A method of auctioning securities comprises:  
entering an order for a security, the order  
specifying a condition that seeks a specific minimum  
relative price improvement and an exposure time;  
10 5 entering a response to the order, the response  
specifying a price, which can be a relative or fixed  
price or a contra-side order that may have a condition  
seeking a relative price improvement, and quantity; and  
15 matching the order with the response in  
20 accordance with the exposure time specified by the  
order.

20 56. The method of claim 55 wherein the order with  
the condition is exposed to the market for the exposure  
15 time and wherein the exposure does not reveal the  
condition.

25 57. The method of claim 55 wherein the order with  
the condition specified the price improvement relative  
30 20 to the national best bid/offer (NBBO).

35 58. The method of claim 55 wherein the order can  
include other conditions including executing all of the  
order or none of the order.

40 25 59. A computer program product residing on a  
computer readable medium for auctioning a product,  
comprising instructions for causing a computer:  
store a pre-defined relative indication that  
corresponds to a willingness to buy or sell the product  
30 with the pre-defined relative indication specifying a  
price relative to a current market price;  
45 receive an order for a product, the order  
specifying a price which can be a relative price, a  
market price or a fixed price, and specifying a  
50 35 quantity; and

5 match the order with the predefined relative  
indication in accordance with a price specified by the  
order.

10 5 60. The computer program product of claim 59  
further comprising instructions to cause a computer to:  
match the order with the predefined relative  
15 indication in accordance with an exposure time specified  
by the order and in accordance with a time of receipt of  
10 the predefined relative indication.

20 61. The computer program product of claim 59  
wherein computer program further comprises instructions  
to cause a computer to:  
15 cause the predefined relative indication to  
remain anonymous as to price, size and identity until  
25 matched with an order.

30 62. The method of claim 59 wherein instructions to  
20 match further comprise instructions to:  
collect all predefined relative indications  
and responses during the exposure interval; and  
match a first one of the orders to an optimal  
35 one of the responses that is determined in accordance  
25 with price and quantity specified in the optimal one of  
the responses.

40 63. The method of claim 59 wherein the products  
are financial instruments.

30 64. A computer program product method of  
45 auctioning securities comprises instructions to cause a  
computer to:  
receive an order for a security, the order  
35 specifying a condition that seeks a specific minimum  
50

relative price improvement and an exposure time;

receive a response to the order, the response  
specifying a price, which can be a relative or fixed  
price or a contra-side order that may have a condition

5 seeking a relative price improvement, and quantity; and

match the order with the response in  
accordance with the exposure time specified by the  
order.

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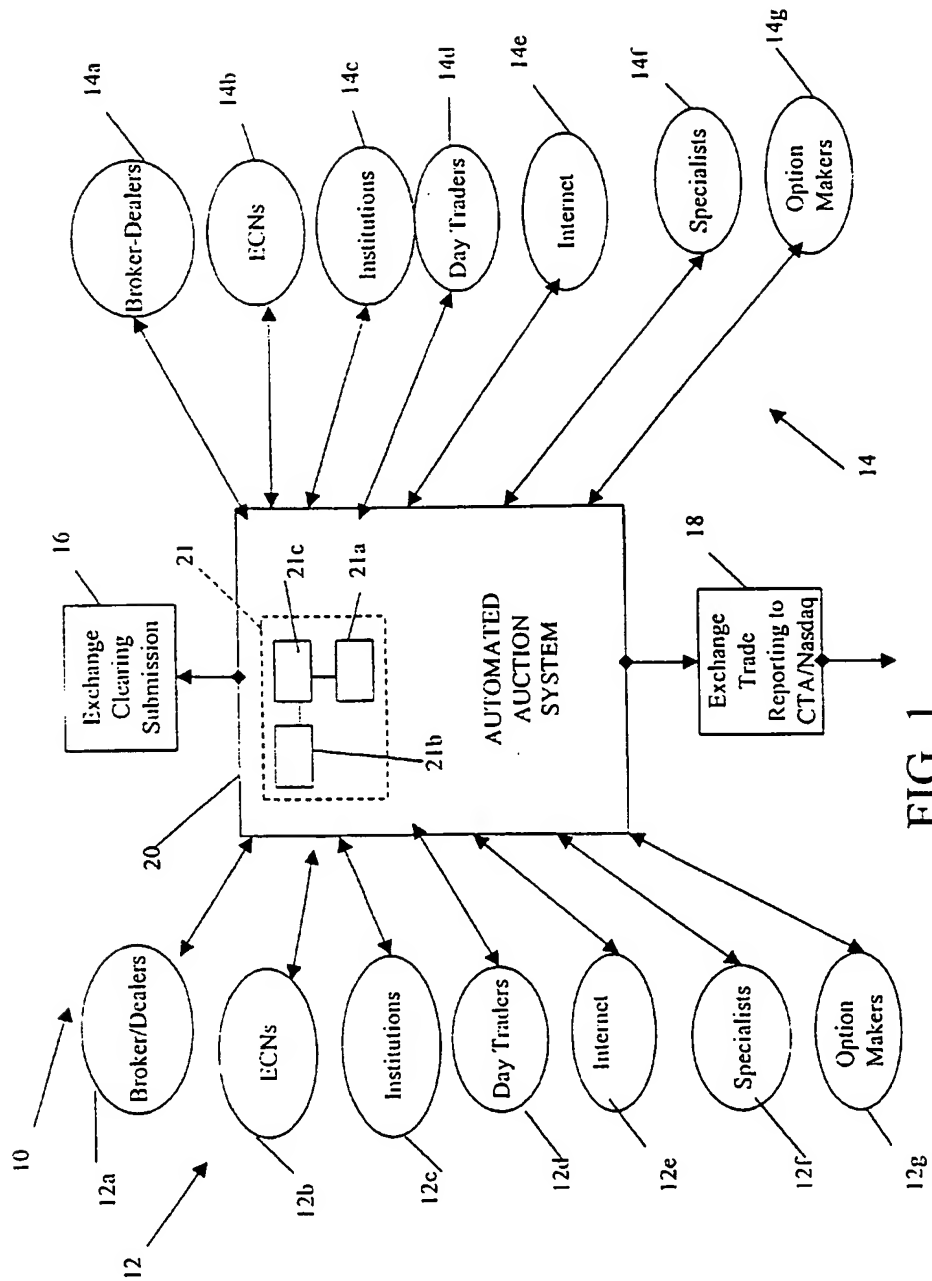


FIG. 1

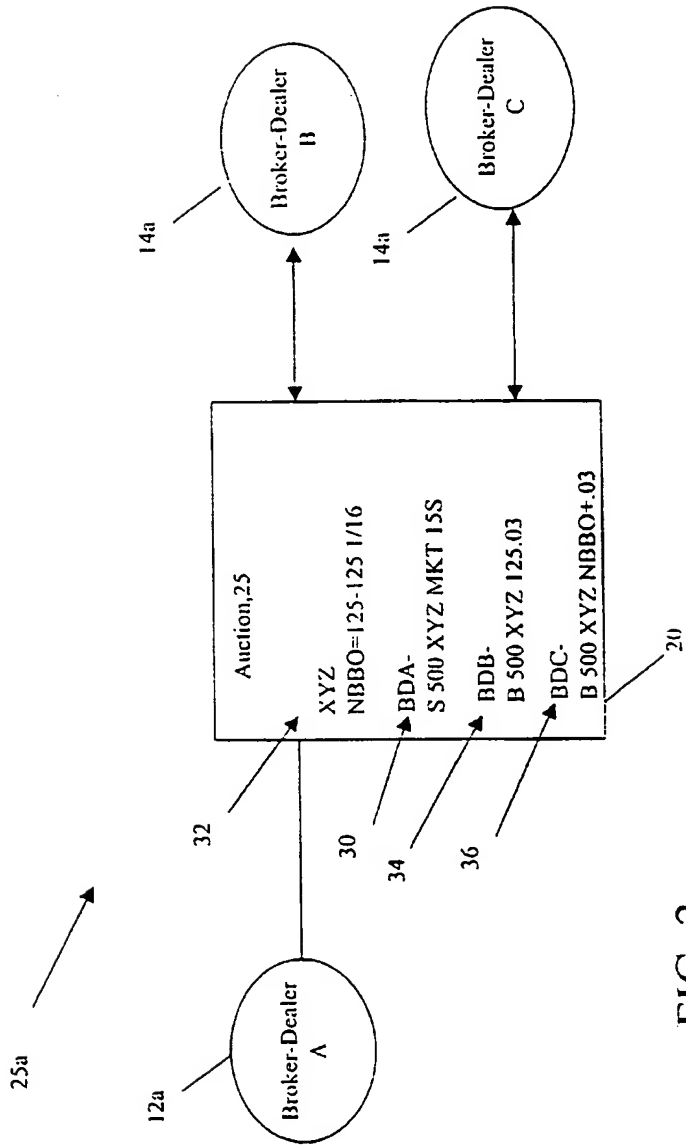


FIG. 2

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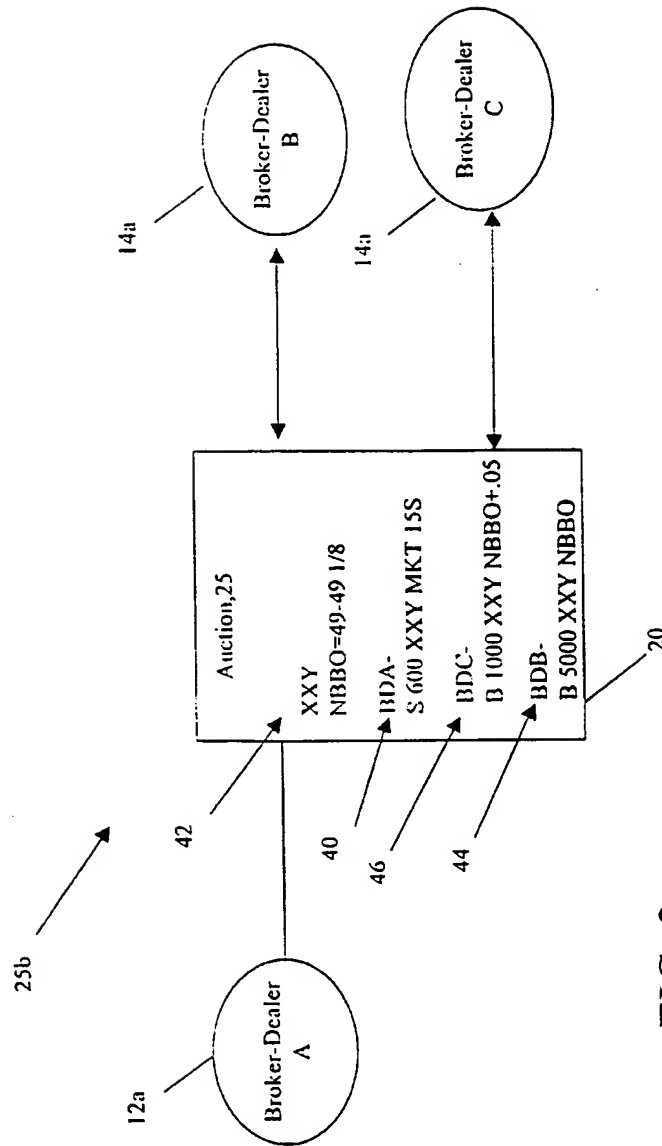


FIG. 3

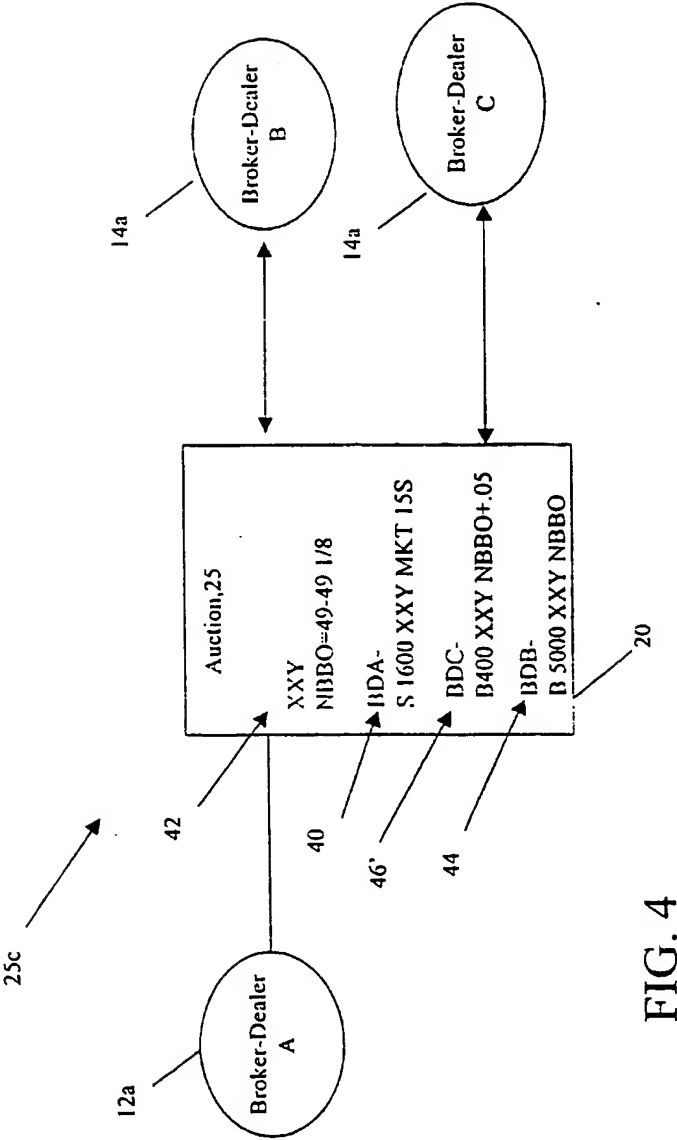


FIG. 4



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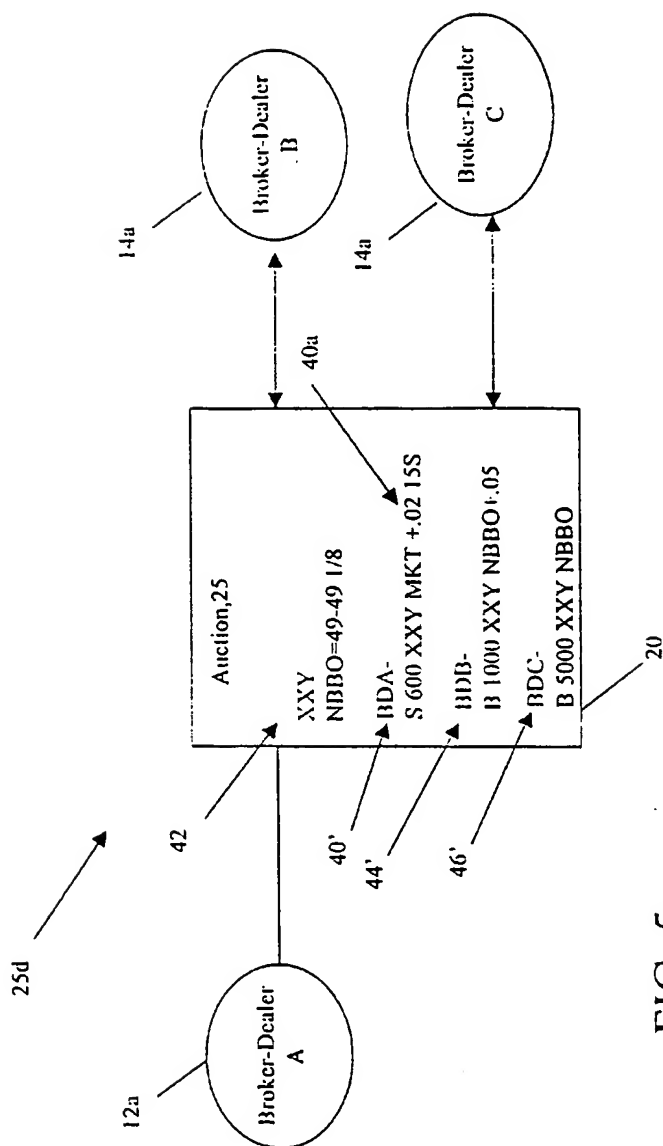


FIG. 5

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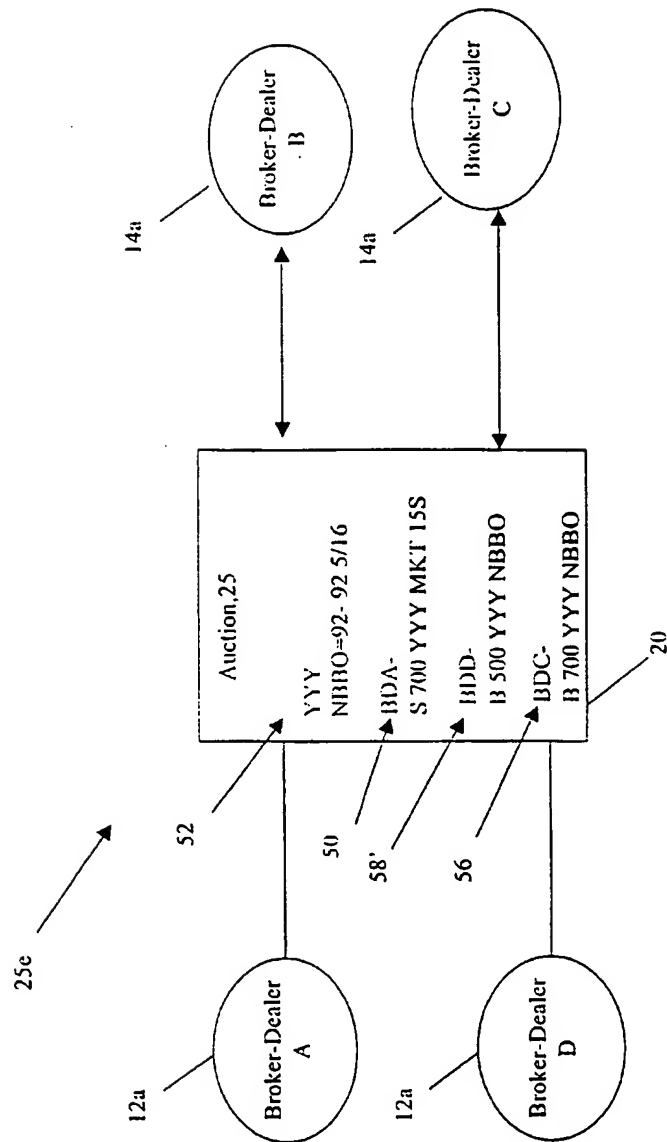


FIG. 6

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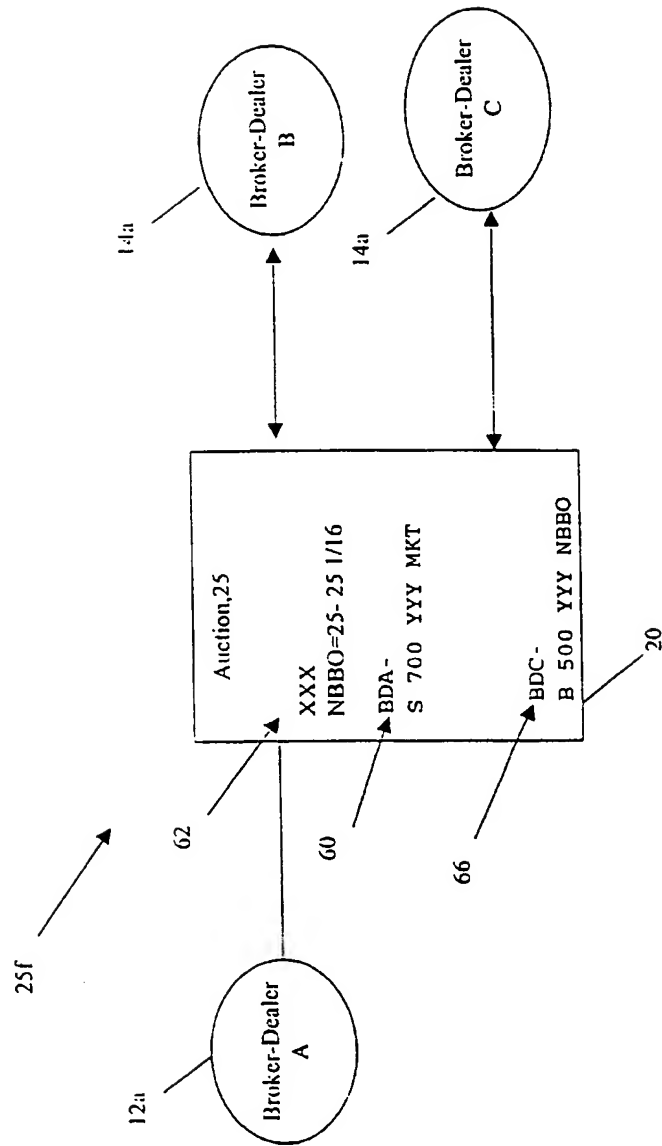


FIG. 7

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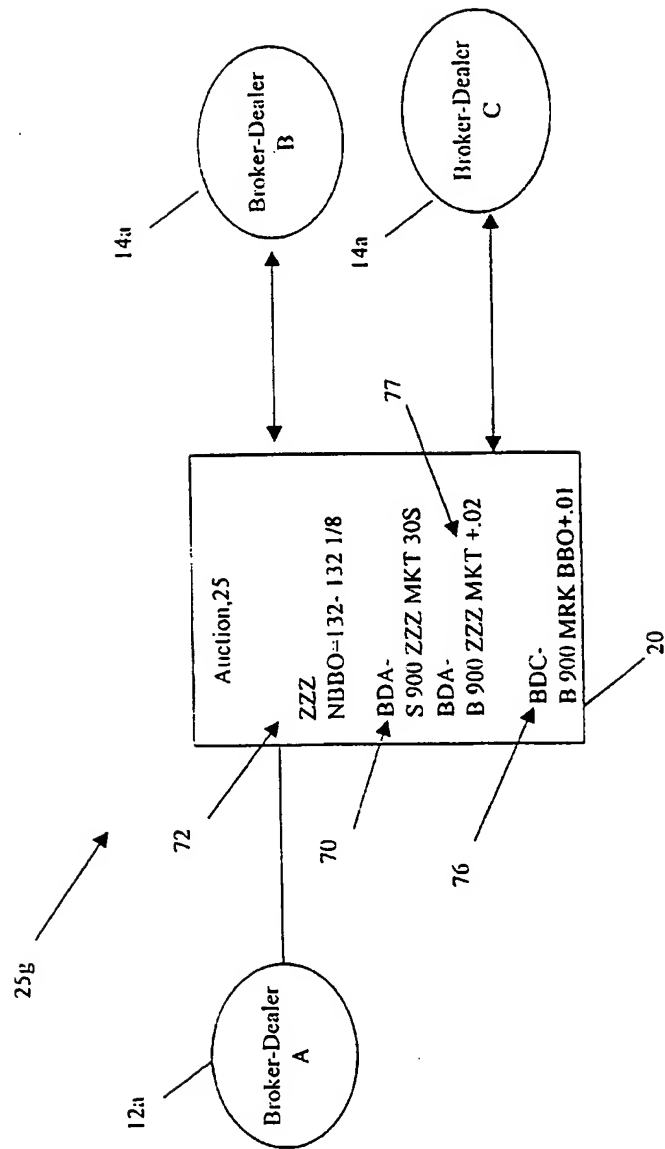


FIG. 8

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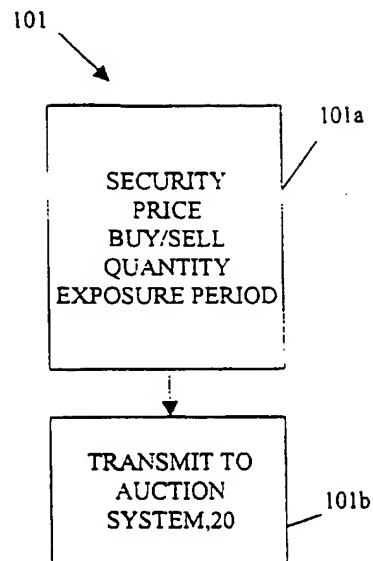


FIG. 9A

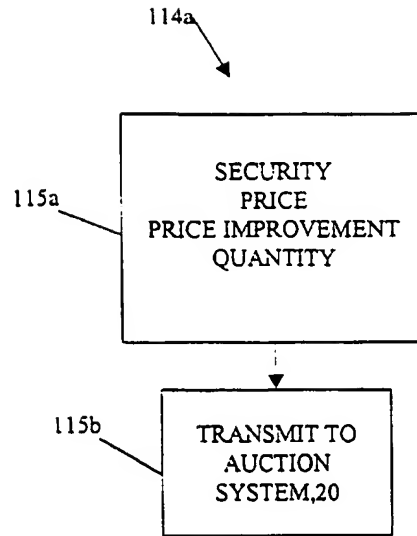


FIG. 9B

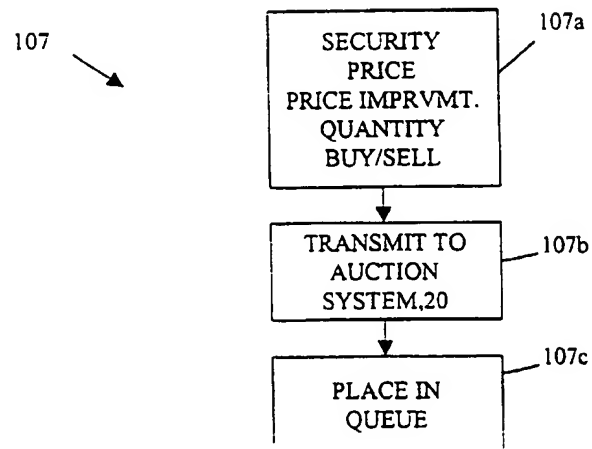
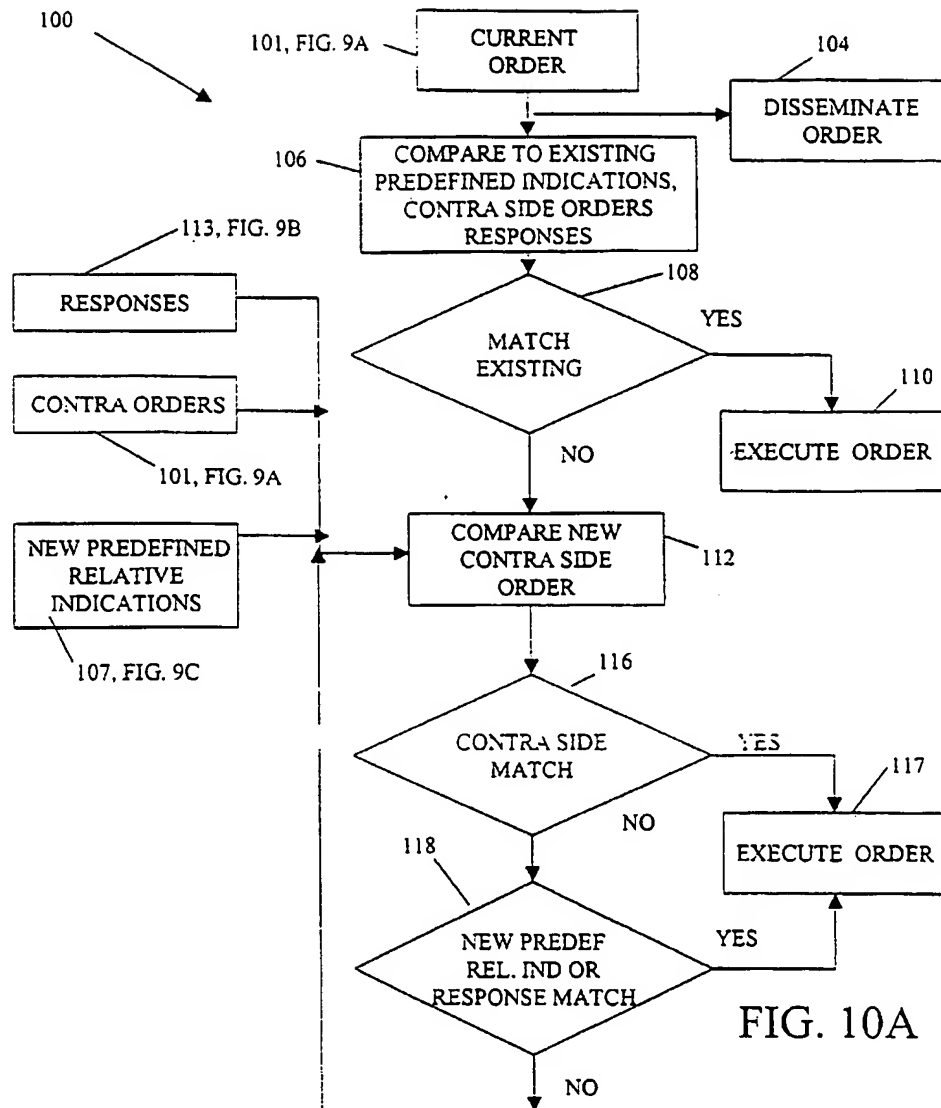


FIG. 9C

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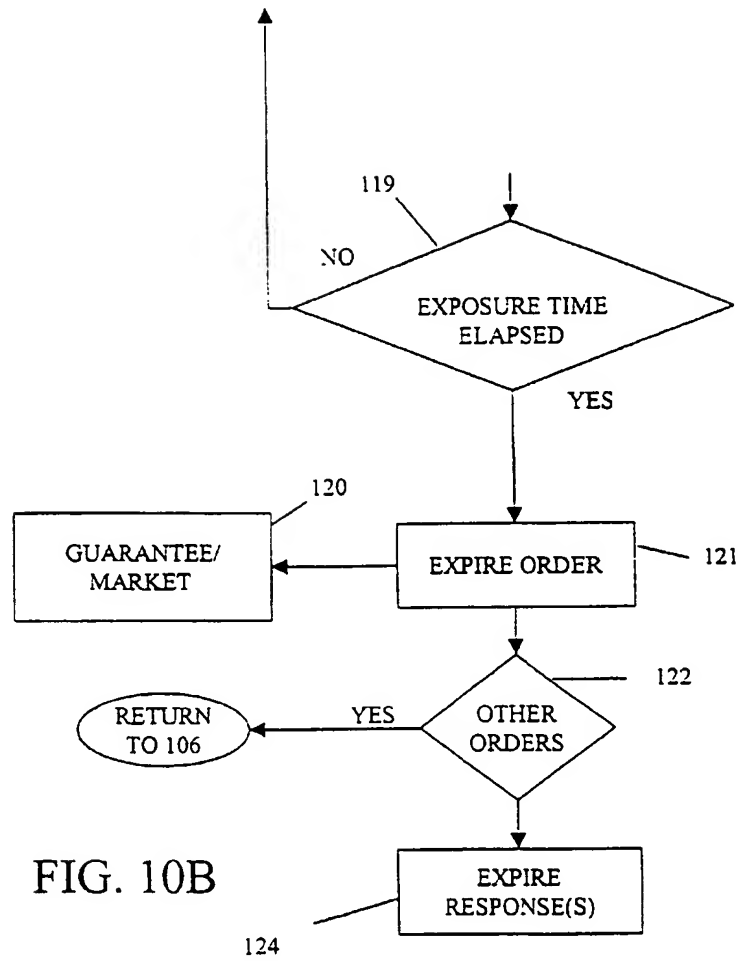


FIG. 10B

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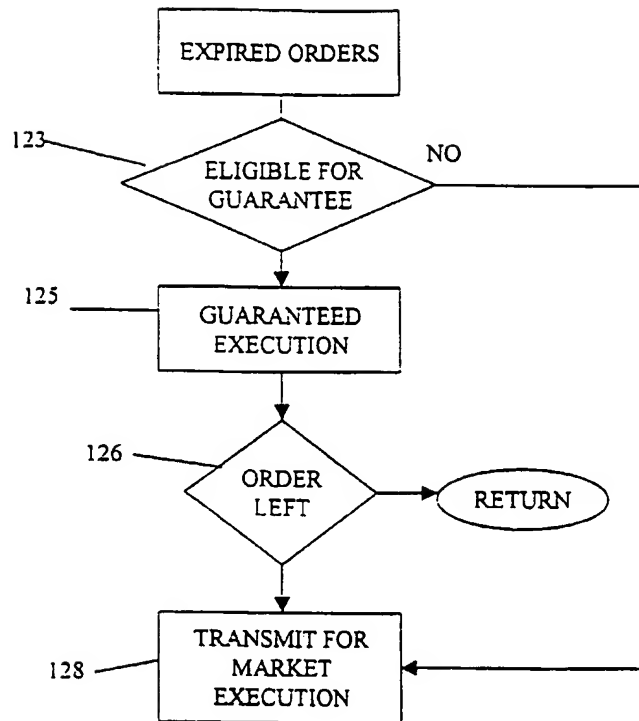


FIG. 10C



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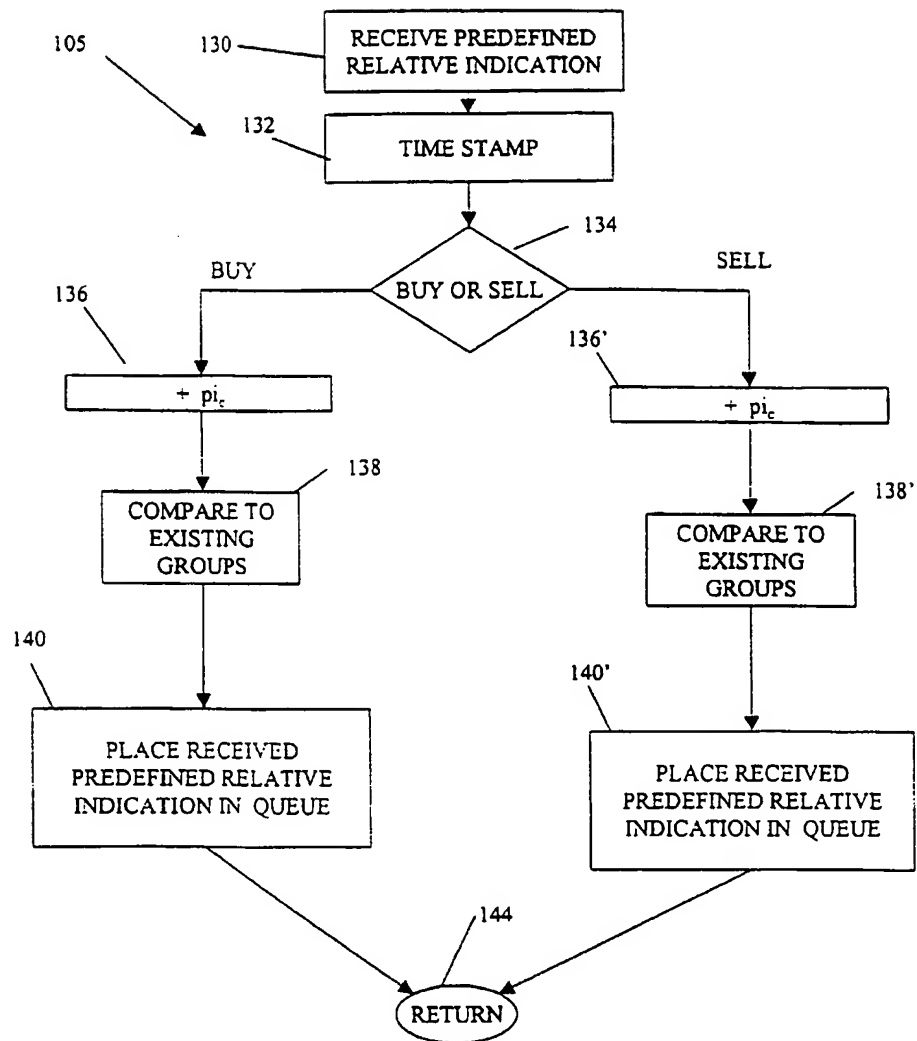


FIG. 11

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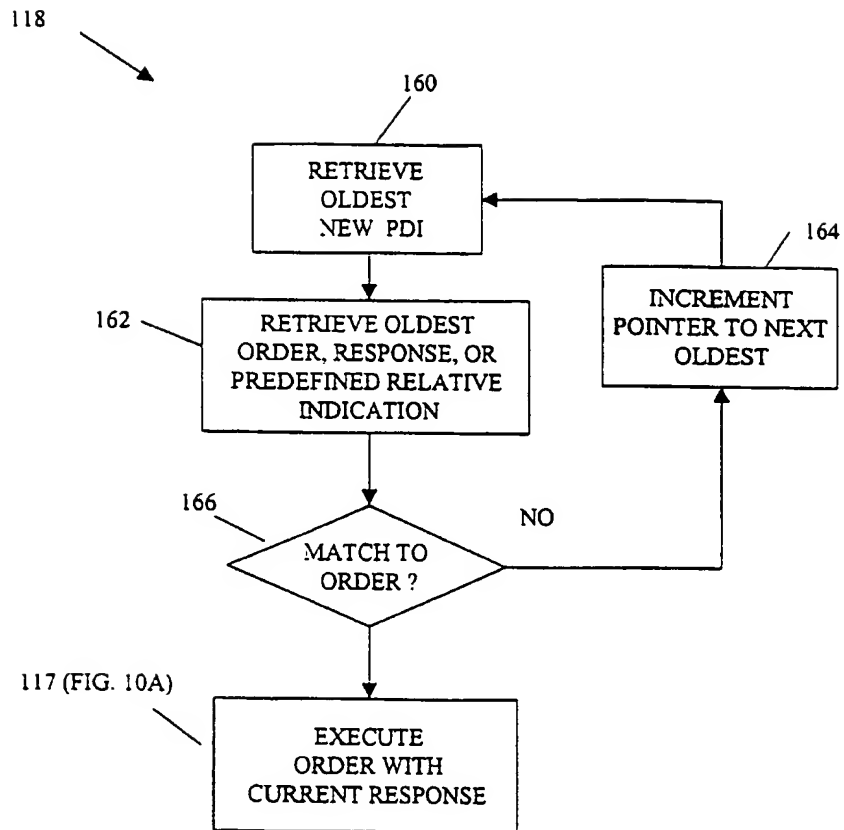


FIG. 12

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US00/07157

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC(7) : G06F 17/30 US CL : 705/26, 37, 42 According to International Patent Classification (IPC) or to both national classification and IPC																				
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) U.S. : 705/26, 37, 42  Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Please See Extra Sheet.																				
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>																				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																		
X — Y	US 4,903,201 A (WAGNER) 20 February 1990 (20.2.90), Fig. 5, 8, col. 1, lines 10-14, col. 3, lines 43-52, col. 5, lines 38-55, col. 7, lines 12-14, col. 10, lines 19-67, col. 12, lines 29-31, col. 13, lines 39-62, col. 6, lines 44-62.	1-2, 4-22, 24-41, 43-49, 51-55, 57-64 ----- 3, 21, 23, 42, 56, 50																		
Y	US 5,845,266 A (LUPIEN) 01 December 1998 (1.12.98), Fig. 11, col. 23, lines 59-64.	3, 21, 50																		
Y	US 5,136,501 A (SILVERMAN et al.) 04 August 1992 (4.8.92), col. 3, lines 39-47, col. 6, lines 44-47, col. 7, 24-25.	23, 42, 56																		
A	US 4,412,287 A (BRADDOCK, III) 25 October 1983 (25.10.83), Entire Document.	1-64																		
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.																				
<table border="0"> <tr> <td>* Special categories of cited documents:</td> <td>"T"</td> <td>later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"X"</td> <td>document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>"E" earlier document published on or after the international filing date</td> <td>"Y"</td> <td>document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>"L" document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>"A"</td> <td>document member of the same patent family</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td></td> <td></td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> <td></td> </tr> </table>			* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	"A" document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"E" earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"L" document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"A"	document member of the same patent family	"O" document referring to an oral disclosure, use, exhibition or other means			"P" document published prior to the international filing date but later than the priority date claimed		
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"E" earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art																		
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"P" document published prior to the international filing date but later than the priority date claimed																				
Date of the actual completion of the international search 09 JUNE 2000		Date of mailing of the international search report 10 JUL 2000																		
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230		Authorized officer Emmanuel Todd <i>James R. Matthews</i> Telephone No. (703) 305-3900																		

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US00/07157

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3,581,072 A (NYMEYER) 25 May 1971 (25.5.71), Entire Document.	1-64
A, P	US 6,014,643 A (MINTON) 11 January 2000 (11.1.00), Entire Document.	1-64
A, P	US 5,926,801 A (MATSUBARA et al.) 20 July 1999 (20.7.99), Entire Document.	1-64
A	Intelligent Electronic Markets for Commodity Auction: An Integrated Approach of Economic Theory and Social Choice Theory, Dissertation Abstracts International, Abstract. 1993	1, 14, 24, 33, 40, 41, 55, 59, 64
A	A Revolution in Securities Markets' Structures, Financial Market Trends, n65, pa15(19), November 1996	1-64

INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US00/07157

B. FIELDS SEARCHED

Electronic data bases consulted (Name of data base and where practicable terms used):

Dialog

search terms: financial transaction, purchase, buy, request, trade, exchange, commodity, asset, bond, future, security, financial instrument, stock, option, auction, sale, match, associate, correlate, determine, predetermined, conditional, market value, contra side order, execute, price, increase, improve, bid, sell, equity.